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A Study of Method in Facial Emotional Recognitation

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Abstract—Facial expressions make important role in social communication and widely used in the behavioral interpretation of emotions. Automatic facial expression recognition is one of the most provocative and stimulate obstacle in computer vision due to its potential utilization such as Human Computer Interaction (HCI), behavioral science, video games etc. Two popular methods utilized mostly in the literature for the automatic FER systems are based on geometry and appearance. Even though there is lots of research using static images, the research is still going on for the development of new methods which would be quiet easy in computation and would have less memory usage as compared to previous methods. This paper presents a quick compare of facial expression recognition. A comparative study ofvarious feature extraction techniques by differentmethod

Keywords- *FER, LBP, LDP, LGC, HOG.*

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I. INTRODUCTION

Image processing it is very interesting to recognize the human gesture for general life applications. The non-verbal communication is the platform by which anyone canknow the physical and mental conditionof a person is the expression of face. The face can explain many things about the person. The facial expression is mainly classified into seven groups namely are neutral, happy, surprise, sad, disgust, fear, and anger. The face expression is the combination of the different part of our face like nose, eye, mouth, lips, eyebrows, cheeks muscles, there is different type combination makes different expression, to detect the facial expression. Automatic facial expression recognition (FER) has become a very interesting and challenging task area for the computer vision field. The application areas of facial expression recognition are globally vastand it'snot limited to mental and physical state identification, but also use in security, automatic counselling systems, lie detection, automated tutorial system, face expression synthesis, music for mood, operator fatigue detection, patient monitoring, its play an important role in securities to detect the suspected person like terrorist, etc.

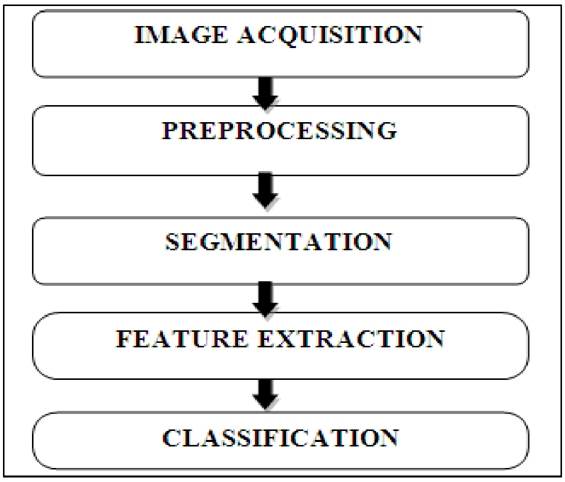

Figure 1. Facial expression Recognition System

FER consists of different steps which shown in the figure Fig.1. The facial feature extraction and analysis of expression is mainly done by the steps noise-removal/improvement is done in the pre-processing step by taking image or image sequence as an input and givesthe face for further processing. The facial component detection can detects the different things like eyes, nose, cheeks, mouth, eye brow, ear, fore-head, etc. The feature extraction step deals with the extraction of features from the ROIs. There are many methods and technique for the feature extraction most popular feature extraction techniques are, but not limited to, Gabor filters, Local Binary Patterns (LBP), Firefly algorithm, Neurofuzzy network, Benzire curve, Eigenspaces.

II. FACIAL EXPRESSION AND IDENTIFY

The facial expression can be based on thechanges in muscles due to deformations wrinkles or based on major compression, expansion, changes in natural shape of eyes, eye-brow, mouth, nose, etc. The Emotional expressions are easily recognized in static displays, but they represent only some percentage of all human facial expressions. In comparison, we have shown that continious information carry in conversational expressions is very essential for properanalysis of those expressions. Several aspect of facial movements is how they support us to distinguish the identity of a person.

Facial emotion are categorized into six, namely anger, disgust, fear, happy, sad, surprise. There is vast research scope in this area depending on the facial and regional behaviour for like in Indian scenario only eyes can give information about the expression like anger, surprise and other emotions. The Figure 2, can show the different expression of our face which can be occurred due to the different combination of nose, eye, eye brows etc. The Table 1 and give the inforatmation about the identify of the different expression

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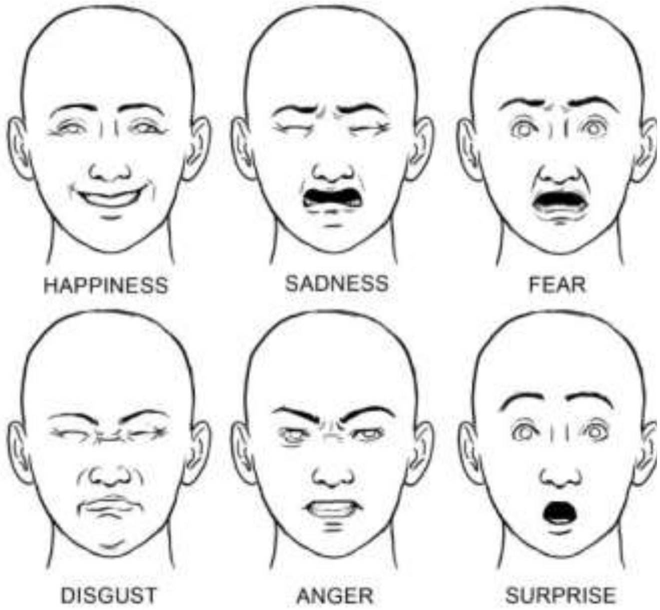

Figure 2 : Six basic Facial Expressions

Table -1: Universal Emotion Identification

Universal Emotion Identification		
Emotion	**Definition**	**Motion of facial part**
Anger	Anger is one of the most dangerous emotions. This emotion may be harmful so, humans are trying to avoid this emotion. Secondary emotions of anger are irritation, annoyance, frustration, hate and dislike.	Eyebrows pulled down, Open eye, teeth shut and lips tightened, upper and lower lids pulled up.
Fear	Fear is the emotion of danger. It may be because of danger of physical or psychological harm. Secondary emotions of fear are Horror, nervousness, panic, worry and dread.	Outer eyebrow down, inner eyebrow up, mouth open, jaw dropped
Happiness	Happiness is most desired expression by human. Secondary emotions are cheerfulness, pride, relief, hope, pleasure, and thrill.	Open Eyes, mouth edge up, open mouth, lip corner pulled up, cheeks raised, and wrinkles around eyes.
Sadness	Sadness is opposite emotion of Happiness. Secondary emotions are suffering, hurt, despair, pitty and hopelessness.	Outer eyebrow down, inner corner of eyebrows raised, mouth edge down, closed eye, lip corner pulled down.
Surprise	This emotion comes when unexpected things happens. Secondary emotions of surprise are amazement, astonishment.	Eyebrows up, open eye, mouth open, jaw dropped
Disgust	Disgust is a feeling of dislike. Human may feel disgust from any taste, smell, sound or tough.	Lip corner depressor, nose wrinkle ,lower lip depressor, Eyebrows pulled down

III. POPULAR FACIAL EXPRESION RECOGNITATION METHOD

The methods widely used for feature extraction. In this, we can study the different method of the facial method. featureare extracted by considering the whole picture as a single unit and applying some sort of filters. In these we can discuss about the method of Local binary pattern, Garbor filter, moth-firefly optimization.

A. Local binary pattern

The local binary pattern is one of the most useful method for the extracting of the useful information from the image which is preprocessed by these technique. This relative new approach was introduced in 1996 by Ojala etal.

In this overlapped LBPoperator, we use the standard size of 3 3 pixel in a (8, 1) neighbourhood for each sub-region.

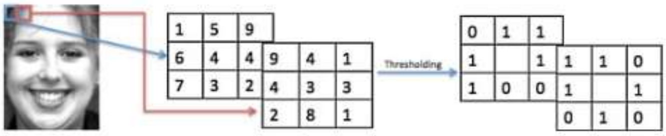

Figure 3: A 3x3 template for LBP operator

After labeling a image with the LBP operator, a histogram of the labeled image (x,y) (x,y) can be defined as

$$H_i = \sum_{x,y} L(f_i(x,y) = i), i = 0, ..., n-1 \quad (1)$$

where n is the number of different labels produced by the LBP operator and

$$L(A) = \begin{cases} 1, \ if \ A \ \text{is} \ true, \\ 0, \ if \ A \ \text{is} \ false, \end{cases} \quad (2)$$

B. Local gradient code

The center pixel of that region is represented by two separate two-bit binary patterns, named as Local Gradient Pattern (LGP) for the pixel. LGP pattern is extracted from each pixel. Facial image is divided into 81 equal sized blocks and the histograms of local LGP features for all 81 blocks are concatenated to build the feature vector. Experimental results prove that the proposed technique along with Support Vector Machine is effective for facial expression recognition. The optimized LGC-HD (based on principle of horizontal diagonal) and LGC-VD (based on the principle of vertical diagonal) are given by eqn.(3) and (4)

$$LGC = s(g_1-g_3)2^7 + s(g_4-g_5)2^6 + s(g_6-g_8)2^5 + s(g_1-g_6)2^4 + s(g_2-g_7)2^3 + s(g_3-g_8)2^2 + s(g_1-g_8)2^1 + s(g_3-g_6)2^0 \quad (2)$$

$$LGC-HD_p^8 = s(g_1-g_3)2^4 + s(g_4-g_5)2^3 + s(g_6-g_8)2^2 + s(g_1-g_8)2^1 + s(g_3-g_6)2^0 \quad (3)$$

$$LGC-VD_p^8 = s(g_1-g_6)2^4 + s(g_2-g_7)2^3 + s(g_3-g_8)2^2 + s(g_1-g_8)2^1 + s(g_3-g_6)2^0 \quad (4)$$

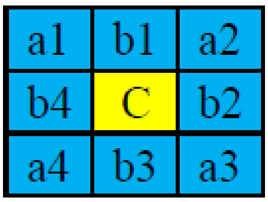

Figure 4; Local Gradient code

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C. Local directional pattern

LDP is a gray-scale texture pattern which characterizes the spatial structure of alocal image texture.In order to get better performance in the presence of variation in illumination and noise, Local DirectionalPattern16 has been developed. A LDP operators are computes the edge response values in all eightdirections at each pixel position and generates a code from the relative strengthmagnitude. In this method, eight Kirsch masks16 of size 3x3 are convolved with image regions of size 3x3 to get a set of 8 mask values. Since the edge responses are more illumination and noise insensitive thanintensity values, the resultant LDP feature describes the local primitives includingdifferent types of curves, corners, junctions; more stably and retains more information.Given a central pixel in the image, the eight directional edge response values{ }, 0,1,...,7 *i m i* = are computed by Kirsch masks *i M* in eight different orientationscentered on its position. Figure 5 shows the bit possition of the local directional pattern

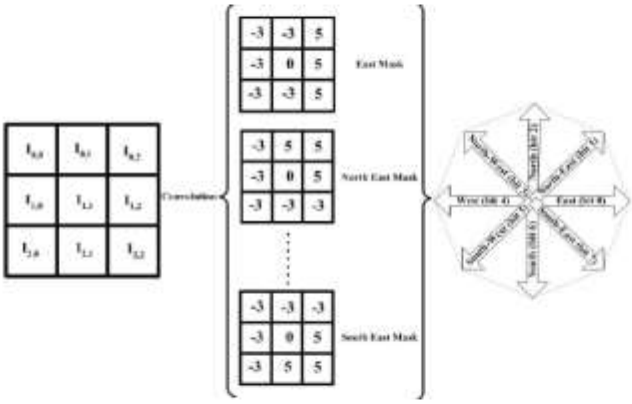


Figure 5: LDP binary bit positions

D. Histogram of gradient orientations

The histogram of oriented gradients (HOG) is a feature descriptor used in computer vision and image processing for the purpose of object detection. The technique counts occurrences of gradient orientation in localized portions of an image. This method is similar to that of edge orientation histograms, scale-invariant feature transform descriptors, and shape contexts, but differs in that it is computed on a dense grid of uniformly spaced cells and uses overlapping local contrast normalization for improved accuracy.he first step of calculation in many feature detectors in image pre-processing is to ensure normalized color and gamma values. As Dalal and Triggs point out, however, this step can be omitted in HOG descriptor computation, as the ensuing descriptor normalization essentially achieves the same result. Image pre-processing thus provides little impact on performance. Instead, the first step of calculation is the computation of the gradient values. The most common method is to apply the 1-D centered, point discrete derivative mask in one or both of the horizontal and vertical directions. Specifically, this method requires filtering the color or intensity data of the image with the following filter kernels:

$$[-1,0,1] \text{ and } [-1,0,1]^T$$

The second step of calculation is creating the cell histograms. Each pixel within the cell casts a weighted vote for an orientation-based histogram channel based on the values found in the gradient computation. The cells themselves can either be rectangular or radial in shape, and the histogram channels are evenly spread over 0 to 180 degrees or 0 to 360 degrees, depending on whether the gradient is “unsigned” or “signed”.

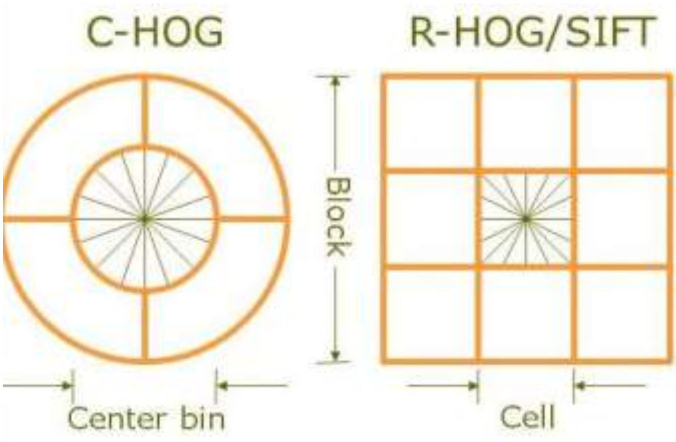
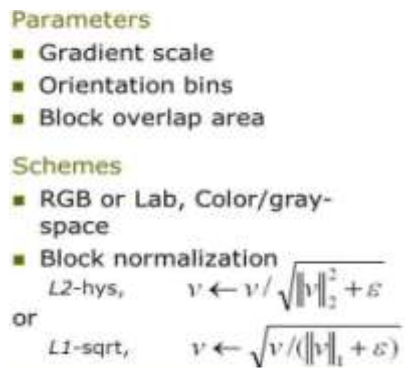


Figure 6: Normalization and descriptor blocks



L2-hys: L2-norm followed by clipping (limiting the maximum values of v to 0.2) and renormalizing,
L1-sqrt schemes provide similar performance, while the L1-norm provides slightly less reliable performance.

IV. CONCLUSION

In this paper, we have studied the four basic emotions feature extraction method. Although different approach are there we have used LBP for feature extraction in order to getbetter performance than gabor method used for feature extraction. In the above algorithm is ofDirect similarity is used for recognizing featureselection and back propagation is used for classiffication purpose. In order to verify the effectivenessof LBP used for the feature extraction we need to compare it with gabor method.. VirtualReality (VR)-based facial expression system is to bedeveloped that is able to collect eye tracking andperipheral psycho-physiological data while thesubjects are involved in emotion recognition tasks.

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V. FUTURE WORK

Image processing technique plays an important role in the detection of the human facial emotions.As a future enhancement we would study andimplement further emotions. Further, continuallychanging emotions in motion pictures can be sortedas a future enhancement. Further, a mobileapplication can be developed.

REFERENCES

[1] Darwin C. The expression of emotions in animals and man. London: Murray 1872.

[2] Mehrabian A. Communication without words. Psychological today 1968;**2**:53□5.

[3] Ekman P, Friesen WV. Constants across cultures in the face and emotion. Journal of personality and social psychology 1971;**17**:124.

[4] 4. Fasel B, Luettin J. Automatic facial expression analysis: a survey. Pattern recognition 2003;**36**:259□75.

[5] 5. Mandal MK, Pandey R, Prasad AB. Facial expressions of emotions and schizophrenia: A review. Schizophrenia bulletin 1998;**24**:399.

[6] Ekman P, Friesen W. Facial action coding system: a technique for the measurement of facial movement. Consulting Psychologists, SanFrancisco 1978.

[7] Guo Y, Tian Y, Gao X, Zhang X. Micro-expression recognition based on local binary patterns from three orthogonal planes and nearest neighbor method. In: Neural Networks (IJCNN), International Joint Conference on. IEEE; 2014, p. 3473□79.

[8] Gizatdinova Y, Surakka V, Zhao G, M¨akinen E, Raisamo R. Facial expression classification based on local spatiotemporal edge and texturedescriptors. In: Proceedings of the 7th International Conference on Methods and Techniques in Behavioral Research. ACM; 2010, p.

[9] KabirMH, Jabid T, Chae O. Local directional pattern variance (ldpv): a robust feature descriptor for facial expression recognition. Int. ArabJ Inf Technol 2012;**9**:382□391.

[10] Ramirez Rivera A, Castillo R, Chae O. Local directional number pattern for face analysis: Face and expression recognition. Image Processing, IEEE Transactions on 2013;**22**:1740□52.

[11] Dalal N, Triggs B. Histograms of oriented gradients for human detection. In: Computer Vision and Pattern Recognition (CVPR). IEEEComputer Society Conference on. IEEE; 2005;**1**: 886□93.

[12] Rajesh R, Rajeev K, Gopakumar V, Suchithra K, Lekhesh V. On experimenting with pedestrian classification using neural network. In:Proc. of 3rd international conference on electronics computer technology (ICECT). 2011, p. 107□11..

[13] Rajesh R, Rajeev K, Suchithra K, Prabhu LV, Gopakumar V, Ragesh N. Coherence vector of oriented gradients for traffic sign recognitionusing neural networks. In: IJCNN. 2011, p. 907□10.

[14] Viola P, Jones M. Rapid object detection using a boosted cascade of simple features. In: Computer Vision and Pattern Recognition (CVPR).Proceedings of the 2001 IEEE Computer Society Conference on 2001;**1**: I□511.

[15] Chen J, Chen D, Gong Y, Yu M, Zhang K, Wang L. Facial expression recognition using geometric and appearance features. In: Proceedings.